

Vegetation Sampling
Of
Tank Seam Access Road
Reference Area

.

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Vegetation Sampling of the Tank Seam Access Road Reference Area

Scope

The Co-Op Mining Company in collaboration with the State of Utah, Division of Oil, Gas & Mining (DOGM) selected a reference areas a standard for future revegetation. The purpose of this document is to provide data for the reference area to be compared with data form an area proposed for disturbance that was sampled in 1992 (called “The Proposed Disturbed Tank Seam Access Road”). This road has been proposed for disturbance to access projected new mining activities by the Co-Op Mining Company.

Introduction

General Site Description

The Tank Seam Access Road Reference Area is located in a native plant community in the same general area as part of the “Proposed Disturbed Tank Seam Access Road.” The proposed disturbance and reference area lie within Bear Canyon, a branch of Huntington Canyon located near the city of Huntington, Utah. Slopes that surround the canyon are primarily dominated by pinion-juniper and mountain brush communities. The sample area was on a east-facing exposure on a 38° slope. In their native, undisturbed state, the canyon bottoms are comprised chiefly of sagebrush/grass and riparian communities.

Bear Canyon maintains active mine facilities. Several areas have been disturbed as a result of the mine activities and some of these areas have been reclaimed and reseeded.

Methods

Sampling methodologies of the reference area closely approximated those from sampling the proposed disturbed areas in 1992. These methods are reported below.

Quantitative and qualitative data were taken on the sample sites. Sampling was accomplished in July 1993.

Transect Placement

Transect lines were randomly placed in the reference area. At regular points on the transect lines a random number was generated which placed each sample location at right angles to the transect lines.

Cover and Composition

As was implemented in sampling the proposed disturbance area, the cover estimates for the reference area were made using ocular methods with meter square quadrants. Species composition and relative frequencies were also assessed from the quadrants. Additional information recorded on data sheets were: established precipitation, erosion, slope, exposure, grazing use, animal disturbance and other appropriate notes.

Woody Species Density

Density of woody plant species were recorded using the point quarter distance method and by sing belt transects. In the pint quarter method, the aforementioned regular pints were placed on the sample sites and delineated into four quarters. The distance to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

Sample Adequacy

Sampling adequacy for woody species density and cover was achieved using formulas form “Statistical Methods” (Snedocor and Cochran 1980), with the goal that at least 80% of the samples were within 10% of the true mean for the plant communities of the area. The formula used is given below.

$$n_{min} = \left[\frac{1.28 (s)}{x (.1)} \right]^2$$

where,

n_{min} = minimum adequate sample

s = standard deviation

x = sample mean

$.1$ = confidence interval

Photographs

Color photographs of the sample area were taken at the time of sampling and were submitted with this report.

Raw Data

The raw data were also submitted with this report (and the previous report for the proposed disturbance area) which would facilitate future scrutiny of the data and future scrutiny of the data and further statistical testing if desired.

Results

Total living cover of the site was estimated at 31.25% (Table 2). Grasses dominated the cover and compromised 67.26% of the living cover (Table 2). As in the proposed disturbed area, the dominate grass species was Salina wildrye (*Elymus salinus*) and was estimated at 19.40% cover. Winterfat (*ceratoides lanata*), however, was the most common woody species followed by pinion pine (*Pinus edulis*) and rabbitbrush (*Chrysothamnus nauseosus*). For a list of cover by species, refer to Table 3.

Woody species density was estimated at 628.72 individuals per acre (Table 4) by the point quarter method. The most abundant species was corymb buckwheat (*Eriogonum cormbosum*) followed by pinion pine. For a statistical comparison of the proposed disturbed area and its reference area, refer to the sampling report for the “Proposed Disturbed Tank Seam Access Road” (March 1993).

Table 1:

**Co-Op Mine Area
Qualitative Sampling Data Sheet and
Quantitative/Qualitative Notes
1993**

Site Name: Tank Seam Access Road Reference Area

Area: Bear Canyon

Date: 21 July 1993

Workers: P. Collins, D. Collins

Slope: 38 deg.

Exposure: E

Animal Use/Disturbance: Moderate deer use

Erosion: Negligible

Cover: (see quantitative data)

Dominant Plant Species Observed: (see quantitative data)

Notes:

1) (see report)

Table 2: Total cover and composition summary for the Tank Seam Access Road Reference Area at the Co-Op Mine.

Total Cover	% Mean Cover	Standard Deviation	Sample Size
Living Cover	31.25	9.20	20
Litter	14.60	12.73	20
Bareground	21.40	12.09	20
Rock	32.75	19.52	20
Composition			
Shrubs	28.49	32.20	20
Forbs	4.25	13.90	20
Grasses	67.26	33.36	20

Table 3: Species cover and frequency summary for the Tank Seam Access Road Reference Area at the Co-Op Mine.

Species	% Mean Cover	Standard Deviation	Sample Size	Relative Frequency
Trees & Shrubs				
Chrysothamnus nauseosus	1.50	4.77	20	10.00
Ceratoides lanata	5.10	11.52	20	20.00
Eriognum corymbosum	1.25	3.11	20	15.00
Pinus edulis	2.75	8.29	20	10.00
Forbs				
Erigeron sp.	0.50	2.18	20	5.00
Stanleya pinnata	0.75	3.27	20	5.00
Grasses				
Elymus cinereus	19.40	10.17	20	95.00

Table 4: Woody species densities of the Tank Seam Access Road Reference Area at the Co-Op Mine.

	Number/Acre
Ceratoides lanata	130.77
Chrysothamnus nauseosus	45.90
Eriogonum corymbosum	248.97
Juniperus osteosperma	32.69
Pinus edulis	175.18
Yucca harrimaniae	13.20
	<hr/>
Total	628.72

Statistical Analyses:

Proposed Disturbed Tank Seam Access Road
vs.
Tank Seam Access Road Reference Area

The Co-Op Mining Company in collaboration with the State of Utah, Division of Oil, Gas & Mining (GOGM) selected a reference area as a standard for future revegetation success. Group comparison statistical analyses were performed to compare the “Proposed Disturbed Tank Seam Access Road” with its reference area.

Student’s t tests indicated the reference area to be significantly greater than the proposed disturbance area for both cover and woody species density (see following summary sheet). The differences could probably be explained in a few ways. Because of its length, the access road had a greater diversity of exposures, slopes, elevations, and other general environmental conditions. Whereas, the reference area was in one general area – with one exposure and all the samples recorded at approximately the same physiognomy. Furthermore, the overstory of the proposed disturbed area was not recorded. If it were recorded and added to the understory, the differences between the two sample areas could have likely been non-significant.

The woody species differences were due to the greater amount of shrubs in the reference area. When one compares the trees (pinion pine and Utah juniper) the densities were similar. Again, the differences probably were a result of the diversity of environmental conditions on the proposed disturbed area when compared to the reference area.

For the above reasons, even with the differences, the reference area selected is probably an appropriate standard for final revegetation success. (The raw data, summation tables and report for the Tank Seam Access Reference Area were reported in Appendix 9-A).

Statistical summary sheet for the Proposed Disturbed Tank Seam Access Road and Tank Seam Access Road Reference Area of the Co-Op Mine.

Proposed Disturbed Tank Seam Access Road

Total Living Cover **	x= 19.50	s= 6.87	n= 40
Density	x= 124.27*	s= 22.48	n= 40
Aspect	variable		
Slope	variable		

Tank Seam Access Road Reference Area

Total Living Cover	x= 31.25	s= 9.20	n= 20
Density	x= 96.79*	s= 19.68	n= 24
Aspect	East		
Slope	38 deg.		

Statistical Analyses

Cover:

Student's t-value = -5.564

Degree of freedom = 58

Significance level = <.005

Density:

Student's t-value = 4.774

Degrees of Freedom = 62

Significance level = <.005

^x = sample mean, ^s = sample standard deviation,
ⁿ = sample size, N.S. = nonsignificant,
^{*} average distance in inches at each sample location
^{**} represents understory cover only.